Skilled Nursing Facility Within-Stay Potentially Preventable Readmission (SNF WS PPR) Measure for the Skilled Nursing Facility Value-Based Purchasing (SNF VBP) Program

Technical Measure Specifications

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1 INTRODUCTION

This report presents the technical measure specifications for the Skilled Nursing Facility Within-Stay Potentially Preventable Readmission (SNF WS PPR) measure. Section 2 provides an overview of the measure, including a measure description, a history of the original version of this measure and the rationale for and summary of the refinements in the current measure, and the purpose and rationale for the original and current versions of the measure. Section 3 describes the measure specifications, including the construction of the denominator and numerator, data sources, measure observation window, the risk adjustment model, and steps for calculating the final measure score.

2 OVERVIEW

This section provides an overview of the SNF WS PPR measure, including a general description of the measure, the history of the measure development, refinements to the original measure and their rationale (Section 2.1), and the purpose and rationale for the measure (Section 2.2). A more detailed explanation of the measure specifications is available in Section 3.

2.1 Measure Description

This potentially preventable readmission (PPR) measure estimates the risk-standardized rate of unplanned, potentially preventable readmissions that occur during skilled nursing facility (SNF) stays among Medicare fee-for-service (FFS) beneficiaries. This outcome measure reflects readmission rates for residents who are readmitted to a short-stay acute-care hospital or Long-Term Care Hospital (LTCH) with a principal diagnosis considered to be unplanned and potentially preventable, and while under SNF care.

The SNF WS PPR measure represents a refinement of the original Skilled Nursing Facility 30-Day Potentially Preventable Readmission (SNFPPR) measure, which was developed to meet the requirements of the Protecting Access to Medicare Act (PAMA) of 2014. The SNFPPR measure assessed PPRs within a 30-day window following discharge from the immediately prior qualifying acute-care hospital stay. Four other measures were developed to assess PPRs within a 30-day window following discharge from each post-acute care (PAC) setting – one measure for each setting (skilled nursing facility [SNF], home health [HH], inpatient rehabilitation facility [IRF], and long-term care hospitals [LTCH]) – to meet the requirements of the Improving Medicare Post-Acute Care Transformation Act of 2014 (IMPACT Act). An additional IRF measure assesses PPRs during the IRF stay (referred to as "the within-stay window"), and was developed for use in the IRF Quality Reporting Program (QRP). These five measures are detailed in separate documents.

The SNFPPR measure was finalized in the FY2017 SNF Prospective Payment System (PPS) final rule for use in the SNF Value-Based Purchasing (VBP) program in August, 2016. The SNF WS PPR measure applies refinements to the SNFPPR measure to improve measure reliability, and addresses concerns about the SNFPPR measure raised by a 2016 Technical Expert Panel (TEP)[1] and the 2015 Post-Acute Care/Long Term Care (PAC/LTC) Measure Application Partnership (MAP)[2]. The input called for aligning specifications across PPR

[1] RTI International. Technical Expert Panel Summary Report: Development of Potentially Preventable Readmission Measures for Post-Acute Care. February 2016. https://www.cms.gov/Medicare/Quality-Initiatives-Patient-Assessment-Instruments/Post-Acute-Care-Quality-Initiatives/Downloads/Potentially-Preventable-Readmissions-TEP-Summary-Report_Feb-2016.pdf

[2] National Quality Forum. MAP 2016 Considerations for Implementing Measures in Federal Programs: Post-Acute Care and Long-Term Care. February 2016.

measures and avoiding duplication of readmissions captured in measures (which was the case between the SNFPPR measure and the SNF PPR post-discharge [PPR-PD] measure). Two substantive refinements were made in developing the SNF WS PPR measure: (1) the outcome observation window was changed from a fixed 30-day window following acute-care hospital discharge to the duration of the SNF stay, and (2) the length of time allowed between a qualifying prior proximal inpatient discharge (the inpatient discharge prior to admission to the index SNF stay) and SNF admission was increased from one day to 30 days. These refinements were implemented to align with and complement the PPR-PD IMPACT Act measure specifications and to align with the qualifying inpatient stay requirement for the Medicare SNF benefit.

The SNF WS PPR measure calculates a risk-adjusted PPR rate for each SNF provider using two years of Medicare FFS claims data. This is derived by first calculating a standardized risk ratio (SRR) – the predicted number of readmissions at the SNF provider (facility) divided by the expected number of readmissions for the same residents if treated at the average SNF provider. The SRR is then multiplied by the mean readmission rate in the population (i.e., all Medicare FFS residents included in the measure) to generate the provider-level risk-standardized readmission rate (RSRR) of potentially preventable readmissions.

2.2 Purpose/Rationale for the Measure

Hospital readmissions among the Medicare population are common, costly, and often preventable.[3, 4] The Medicare Payment Advisory Commission (MedPAC) and a study by Jencks et al. estimated that 17-20 percent of Medicare beneficiaries discharged from the hospital were readmitted within 30 days. Among these hospital readmissions, MedPAC has estimated that 76 percent were considered potentially avoidable and associated with $12 billion in Medicare expenditures.[5, 6] The Centers for Medicare & Medicaid Services (CMS) has addressed the high rates of hospital readmissions for the acute-care hospital setting and more recently, among PAC providers. For example, CMS developed the Skilled Nursing Facility 30-Day All-Cause Readmission Measure (SNFRM). The SNFRM was adopted for the SNF VBP program in FY2016.

[3] Friedman B, Basu J. The rate and cost of hospital readmissions for preventable conditions. *Med Care Res Rev*. 2004;61(2):225-40.
[4] Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare fee-for-service program. *N Engl J Med.* 2009;360(14):1418-28.
[5] MedPAC. Payment policy for inpatient readmissions. In: Report to the Congress: Promoting Greater Efficiency in Medicare. June 2007:103-120. https://www.medpac.gov/wp-content/uploads/2022/08/Jun07_EntireReport_SEC.pdf.
[6] Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare fee-for-service program. *N Engl J Med.* 2009;360(14):1418-28.

Section 215(a) of PAMA required that a resource use measure reflecting an all-condition, risk-adjusted, potentially-preventable hospital readmission rate for SNFs be specified by October 1, 2016 for use in the SNF VBP program, with the statute further stating that the SNFRM could be replaced by said PPR measure as soon as practicable.[7] CMS thus developed the SNFPPR measure, which was specified for the SNF VBP program in the FY2017 SNF PPS final rule. Building on refinements that have since been made to the SNFPPR measure, the SNF WS PPR measure is focused on potentially preventable hospital readmissions that occur during a SNF stay.

[7] Protecting Access to Medicare Act of 2014. Pub. L. 113-93. April 1, 2014.

3 MEASURE SPECIFICATIONS

This section describes the methodology used to construct the SNF WS PPR measure. Sections 3.1 and 3.2 describe the denominator and numerator, respectively. Section 3.3 details the data sources used to calculate the measure score, and Section 3.4 defines the measure observation window. Lastly, Section 3.5 describes the risk adjustment model and variables used for risk adjustment, and Section 3.6 presents the steps involved in calculating the final measure score.

3.1 Denominator

The SNF WS PPR measure is based on two years of Medicare FFS claims data. Only SNF stays where residents had a qualifying acute-care hospital stay within 30 days prior to the SNF admission date are included in the measure. The observation window is the period covering the SNF stay (i.e., the day after admission through the day of discharge). Prior proximal hospital stays include an inpatient admission to an acute-care hospital (including a hospital eligible for the Inpatient Prospective Payment System [IPPS], a critical access hospital [CAH], or a psychiatric hospital). Following are the SNF WS PPR exclusions:

1) SNF resident less than 18 years old.

   Rationale: Residents less than 18 years old are not included in the target population for this measure. Pediatric residents are relatively few and may have different patterns of care from adults.

2) SNF stays where the resident did not have at least 12 months of continuous FFS Medicare enrollment prior to the SNF admission (measured as enrollment during the month of SNF admission and the 11 months prior to that admission).

   Rationale: FFS Medicare claims are used to identify comorbidities during the 12-month period prior to the SNF admission for risk adjustment.

3) SNF stays in which the resident did not have continuous FFS Medicare enrollment for the entire risk period (measured as enrollment during the month of SNF admission through the month of SNF discharge).

   Rationale: Readmissions occurring within the SNF stay risk window when the resident does not have FFS Medicare coverage cannot be detected using claims.

4) SNF stays with a gap of greater than 30 days between discharge from the prior proximal hospitalization and the SNF admission.

Rationale: These measures require information from a proximal short-term acute-care stay for risk adjustment. This also aligns with the qualifying inpatient stay requirement for the Medicare SNF benefit.

5) SNF stays where the resident was discharged from the SNF against medical advice.

   Rationale: The SNF was not able to complete care as planned.

6) SNF stays in which the principal diagnosis for the prior proximal hospitalization was for the medical treatment of cancer. Residents with cancer whose principal diagnosis from the prior proximal hospitalization was for other diagnoses or for surgical treatment of their cancer remain in the measure.

   Rationale: These residents have a very different mortality and readmission risk than the rest of the Medicare population, and outcomes for these residents do not correlate well with outcomes for other residents.

7) SNF stays in which the principal diagnosis for the prior proximal hospitalization was for pregnancy.

   Rationale: This is a very atypical reason for residents to be admitted to SNFs.

8) SNF residents who were transferred to a federal hospital from the SNF.

   Rationale: Residents who are transferred to federal hospitals will not have complete inpatient claims data.

9) SNF residents who received care from a provider located outside of the United States, Puerto Rico, or a U.S. territory.

   Rationale: Residents who received care from foreign providers may not have complete inpatient claims in the system, and these providers may not be subject to policy decisions related to readmissions.

10) SNF stays with data that are problematic (e.g., anomalous records for hospital stays that overlap wholly or in part or are otherwise erroneous or contradictory).

    Rationale: This measure requires accurate information from the SNF stay and prior short-term acute-care stays in the elements used for risk adjustment. No-pay SNF stays after exhaustion of Part A benefits are also excluded.

11) SNF stays occurring in a CAH swing bed.

    Rationale: To ensure alignment with the population of SNFs eligible for the SNF VBP program, stays at CAH swing beds are excluded from the denominator. CAH swing bed facilities are not required to submit quality data under the SNF QRP, and are exempt from the SNF PPS.

NOTE: Residents who expire during the readmission window are not excluded from the measure.

The measure does not have a simple form for the denominator – that is, the risk adjustment method does not make the observed number of eligible stays the denominator. The measure denominator is the risk-adjusted "expected" number of residents with a PPR that occurred during the SNF stay. This estimate starts with the observed (unadjusted) number of residents with a PPR and is then risk-adjusted for resident characteristics. It is the "expected" number of residents with a PPR if the same residents were treated at the average SNF provider - i.e., a facility-specific effect is not included in the calculation. (see Sections 3.5 and 3.6 for additional detail)

3.2 Numerator

The numerator is the number of SNF stays by residents in the target population that have a PPR during the index SNF stay. PPRs include readmissions to a short-stay acute-care hospital or LTCH, with a diagnosis considered to be unplanned and potentially preventable.

Based on the TEP input, a set of conditions considered potentially preventable for the post-SNF discharge and within-stay readmission windows was determined. Since the measures' initial development, the current measure development contractor (Acumen, LLC) has reviewed and refined the PPR definition (in line with TEP recommendations) using an expert clinician review team to account for code updates. Because this measure is focused on readmissions that are potentially preventable and unplanned, planned readmissions are not counted in the numerator. Planned readmissions are defined largely by the definition used for the Hospital-Wide All-Cause Unplanned Readmission (HWR) measure, with refinements to include additional procedures determined suitable for the PAC setting. Unplanned readmissions are identified using the Planned Readmission Algorithm updated annually and available on QualityNet at: https://qualitynet.cms.gov/inpatient/measures/readmission/methodology. [8]

The conceptual definition of PPR hinges on the readmission window timeframe. As noted above, the readmission window associated with the SNF WS PPR measure is the within-SNF stay period (the day after SNF admission through the day of discharge). Included in this within-SNF stay period are PPRs during the SNF stay or direct transfers to a hospital at the end of the SNF stay.

Similar to the denominator, the measure does not have a simple form for the numerator – that is, the risk adjustment method does not make the observed number of readmissions the numerator. Instead, the numerator is the risk-adjusted "predicted" estimate of the number of

[8] The annual HWR reports provide information on the availability of the HWR model software SAS packs and their updates.

residents with a potentially preventable, unplanned readmission that occurred during the SNF stay. This estimate starts with the observed (unadjusted) number of residents with a PPR and is then risk-adjusted for resident characteristics and a statistical estimate of the SNF's facility effect (see Sections 3.5 and 3.6 for additional detail).

3.3 Data Sources

This measure is based on Medicare FFS administrative data and uses the data in the Medicare eligibility files and inpatient claims. The eligibility files provide information on date of birth, sex, reasons for Medicare eligibility, periods of Part A coverage, and periods in the FFS program. The data elements from the Medicare FFS claims are those basic to the operation of the Medicare payment systems and include date of admission, date of discharge, diagnoses, procedures, indicators for use of dialysis services, and indicators of whether the Part A benefit was exhausted. The inpatient claims data files contain beneficiary-level SNF and other hospital records. No data beyond the bills submitted in the normal course of business are required from providers for the calculation of this measure.

3.4 Measure Time Window

All SNF stays during the measure's two-year window, except those that meet the exclusion criteria, are included in the calculations. For SNF residents with multiple SNF stays during the two-year window, each stay is eligible for inclusion in the measure. Data from fiscal years 2019-2020 were used in the refinements of this PPR measure.[9]

3.5 Statistical Risk Model and Risk Adjustment Covariates

The statistical methods, including risk adjustment, were developed to harmonize with the HWR measure as well as the SNF PPR-PD measure. The following section summarizes the risk adjustment approach for the SNF WS PPR measure.

A hierarchical logistic regression is used to predict the probability of a PPR. The resident characteristics related to each discharge and an identifier for the specific discharging SNF provider are included in the equation. The equation is hierarchical in that individual resident characteristics are accounted for as well as the clustering of residents into SNF providers. The statistical model estimates both the effect on the probability of readmission of the resident characteristics across all providers and the estimated effect of each provider on readmissions that differs from that of the average provider. The provider effects are assumed to be randomly distributed around the average (according to a normal distribution).

[9] Through measure respecification activities, two years of data was found to improve the measure's statistical reliability relative to one year of data.

When computing the facility effect, hierarchical modeling accounts for the known predictors of readmissions on average, such as resident characteristics, the observed provider rate, and the number of SNF stays eligible for the measure. The estimated provider effect is determined mostly by the provider's own data if the number of SNF stays is relatively large (as sufficient information on the provider's performance is available), but is adjusted toward the average if the number of SNF stays is small (as not enough information on the provider's performance is available).

The measure uses the following model:

Let Y_{ij} denote the outcome (equal to 1 if resident *i* is readmitted within 30 days, zero otherwise) for a resident *i* at SNF *j*; Z_{ij} denotes a set of risk factors. The measure assumes the outcome is related linearly to the covariates via a logit function with dispersion:

$$\text{logit}(\text{Prob}(Y_{ij}=1)) = \alpha_j + \beta * Z_{ij} \qquad (1)$$
$$\alpha_j = \mu + \omega_j\,;\ \omega_j \sim N(0, \tau^2)$$

where Z_{ij} $(= Z_1, Z_2, \ldots Z_k)$ is a set of *k* resident-level covariates, α_j represents the SNF-specific intercept, μ is the adjusted average outcome over all SNF providers, and τ^2 is the between-SNF variance component.

The estimated parameters are used twice in the measure. The sum of the probabilities of readmission for all SNF stays in the measure, including the effects of both resident characteristics and provider, is the "predicted" number of readmissions after adjusting for the provider's case mix. The same equation is used without the provider effect to compute the "expected" number of PPRs for the same SNF stays at the average provider. The ratio of the predicted-to-expected number of readmissions is a measure of the degree to which the readmissions are higher or lower than what would otherwise be expected. This standardized risk ratio (SRR) is then multiplied by the mean readmission rate for all SNF stays for the measure, yielding the risk-standardized readmission rate (RSRR) of PPRs for each SNF. This estimation procedure is recalculated for each measurement period. Estimating the risk-adjustment model for each measurement period allows the estimated effects of the resident characteristics to vary over time as medical treatment patterns change.

Risk-adjustment variables include demographic and eligibility characteristics, principal diagnoses, surgery or procedure types from the prior acute-care stay, comorbidities, length of stay and intensive care unit/critical care unit (ICU/CCU) utilization from the immediately prior acute-care stay, and number of acute-care discharges in the year preceding the SNF admission.

The risk-adjustment variables used in the model include the following:

1) Age/sex categories

2) Original reason for Medicare entitlement (disability or other)

3) Indicator for end-stage renal disease (ESRD)

4) Surgery category if present (e.g., cardiothoracic, orthopedic), defined as in the HWR model software; the procedures are grouped using the Clinical Classification Software (CCS) classes for International Classification of Diseases (ICD)-10 procedures developed by AHRQ

5) Principal diagnosis on prior proximal hospital inpatient claim as in the HWR measure; the ICD-10 codes are grouped clinically using the CCS mappings developed by the Agency for Healthcare Research and Quality (AHRQ)

6) Comorbidities from secondary diagnoses on the prior proximal hospital inpatient claim and diagnoses from earlier hospital inpatient claims up to one year before the index SNF admission (these are clustered using the Hierarchical Condition Category [HCC] groups used by CMS)

Prior Utilization Measures (vary by measure):

1) Length of stay in the prior proximal acute-care stay (categorical to account for nonlinearity)

2) Prior acute ICU/CCU utilization

3) Count of prior acute-care hospital discharges in the prior year

3.6 Measure Calculation Algorithm

The Medicare SNF claims are matched to prior acute-care stays, acute-care stays during the SNF stay and post-SNF discharge, and resident eligibility data to determine which stays remain in the measure (i.e., are not excluded per the exclusions described above) and which have potentially preventable, unplanned readmissions.

The measure is calculated according to the following steps:

Step 1: Identify residents meeting the denominator (measure inclusion) criteria

Step 2: Identify residents meeting the numerator (PPR) criteria taking into account the planned readmission algorithm

Step 3: Identify presence or absence of risk-adjustment variables for each resident

Step 4: Calculate the predicted and expected number of readmissions for each SNF provider using hierarchical logistic regression model

The predicted number of readmissions for each SNF provider is calculated as the sum of the predicted probability of readmission for each SNF stay included in the measure from the

provider, including the provider-specific effect. The expected number of readmissions for each SNF provider is computed the same way as the predicted number, but with the facility effect set at the average value of 0. The model-specific risk-standardized readmission ratio for each SNF provider associated with the WS PPR measure is calculated as follows:

To calculate the predicted number of readmissions $pred_j$ for index SNF provider stays at $provider_j$, use

$$pred_j = \Sigma logit^{-1}(\mu + \omega_\iota + \beta * Z_{ij}) \quad (2)$$

where the sum is over all stays in SNF_j, and ω_i is the random intercept. To calculate the expected number exp_j use

$$exp_j = \Sigma logit^{-1}(\mu + \beta * Z_{ij}) \quad (3)$$

Then, as a measure of excess or reduced readmissions among index stays at SNF $provider_j$, calculate the provider-wide standardized risk ratio, SRR_j, as

$$SRR_j = pred_j / exp_j \quad (4)$$

Step 5: Calculate the risk-standardized SNF potentially preventable readmission rate

The value obtained from equation (4) above, the SRR_j, is the SNF provider-wide standardized risk ratio for $provider_j$. To aid interpretation, SRR_j is then multiplied by the overall national raw readmission rate for all SNF stays, $\bar{Y}$, to produce the provider-wide risk-standardized readmission rate ($RSRR_j$).

$$RSRR_j = SRR_j * \bar{Y} \quad (5)$$